Announcing the Final Examination of Daljit Sandhu for the degree of Doctor of Philosophy

Time & Location: June 28, 2019 at 9:00 AM in Engineering 2 211 P
Title: Modeling of Complex Karst Systems in Central Florida

Groundwater aquifers make up the primary source of drinking water in Florida. It is imperative to protect and maintain water quality to ensure optimal drinking water conditions. Florida is known for being prone to sinkholes due to karst features. One sinkhole event occurred beneath a phosphogypsum stack, and leaked a large amount of radioactive waste in the Floridan aquifer, raising water quality concerns. To study the behavior of contaminant transport, the radioactive waste plume was modeled by coupling hydraulic and chemistry concepts. Adsorption was studied to see if it can serve as a potential remediation solution to the contaminant waste, using available adsorption knowledge and data from previous studies. Results suggest that simulating mineral adsorption helped limit how far the waste stack would travel in the aquifer, however it would still pose risk in water quality, as drinking water wells are situated along the path of the contaminant plume. Implementation of treatment wells and monitoring would ensure drinking water criteria are met. Acknowledging that the Floridan aquifer contains karst features that consist of limestone fractures and the rock matrix, groundwater flow patterns may be influenced over time. For instance, fractures (or conduits) can conduct larger amounts of groundwater at higher conductivities, which could have implications on groundwater/contaminant transport. To model this process, a karst evolution model utilizing hydraulic and chemistry concepts are applied in a basin in Florida. Results indicate the karst model reproduces head profiles and estimates the age of several conduits. A sensitivity analysis was conducted to investigate how karst evolution is influenced by hydraulic and chemistry parameters. Results show that fracture length has more influence on karst evolution, however other physical parameters show some influence as well. Overall, an improved understanding of karst processes can aid in better characterizing conduit flow patterns and improve water resources management.

Major: Civil Engineering

Educational Career:
Bachelor's of Civil Engineering, BS, 2014, University of Central Florida
Master's of Civil Engineering - Water Resources, MS, 2016, University of Central Florida

Committee in Charge:
Arvind Singh, Chair, Civil, Environmental and Construction Engineering
Dingbao Wang, Co-Chair, Civil, Environmental and Construction Engineering
Boo Hyun Nam, Civil, Environmental and Construction Engineering
Qipeng Zheng, Industrial Engineering & Management Systems

Approved for distribution by Arvind Singh, Committee Chair, on June 14, 2019.

The public is welcome to attend.